

A REVISION OF THE *BRÜELIA* (MALLOPHAGA)  
SPECIES INFESTING THE CORVIDAE

PART I

BY

M. ATIQUR RAHMAN ANSARI *anf*

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# A REVISION OF THE *BRÜELIA* (MALLOPHAGA) SPECIES INFESTING THE CORVIDAE

## PART I

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### INTRODUCTION

Two distinct types of *Brüelia* are found on the Corvidae. The first has the body feebly sclerotized and the abdominal chaetotaxy scarce; these are similar to those species of *Brüelia* which commonly infest other passerines, for example, Fringillidae, Laniidae, Timaliidae and Sturnidae. In this group are *Brüelia deficiens* (Piaget), *B. zohrae* and *B. zavattariornis*. The second type has the body more heavily sclerotized and robust in form; this group can be further subdivided into forms with broad and narrow heads respectively.

The identification of the different members of the genus *Brüelia*, especially of females, is sometimes very difficult. The distinguishing features utilized here have been mainly the shape of the head, the length of the preantennal region and its width, as well as the index of the total head length to the width. An examination of the male genitalia shows that there are a number of distinct and easily recognizable species. The abdominal chaetotaxy and shape of the tergal plates and the shape of the female genital plate are also helpful in separating the species. With respect to the genital plate, it is not only the pattern of coloration but also the number of marginal hairs which are of use. During these studies we have observed that allied forms are commonly indistinguishable from each other in the female sex, though easily separated in the male. In the present communication the taxonomy is, therefore, mainly based on the male sex.

The linear measurements were taken along the midline; the length of the preantennal region is from the anterior margin to an imaginary line drawn between a point immediately behind each conus; the region behind this line is considered as the hind-head. Breadths represent the maximum transverse measurement of the part. The cephalic index is the ratio of length to breadth of the head (Waterston, 1928). As the length and breadth of the head remain fairly constant for a species they can be used as reliable criteria of specific difference.

Most of the specimens including holotypes and allotypes are in the collections of

the British Museum (Natural History) ; exceptions are indicated in the text. Text-figures were drawn from the type material with an Abbé camera lucida.

#### ACKNOWLEDGMENTS

The author considers it his privilege to express his deepest gratitude to Miss Theresa Clay for her advice and suggestions at every stage of this work. He also wishes to thank Mr. N. D. Riley for so very kindly giving him facilities to work in his department. Grateful thanks are also due to Mr. G. H. E. Hopkins for the loan of some notes on the nomenclature of described species. To his former Professor, Mr. M. Afzal Husain, the author is much indebted for inspiration and encouragement throughout these studies. He would also like to put on record the help and cooperation he has received from his wife, Zohra Rahman during his stay in England.

### *Brüelia glandarii* (Denny), 1842

(Text-figs. 1—6)

*Nirmus glandarii* Denny, 1842, *Mon. Anopl. Brit.* : 51, 129, pl. 8, fig. 3.

Type host : *Garrulus glandarius rufitergum* Hartert.

MALE. Head triangular with broadly concave apex. Pre-antennal area with marginal carina interrupted medianly and laterally. Anterior margin hyaline. Dorsal suture well marked. Anterior plate squarish with conspicuous ventral component. Ventral carina interrupted medianly and continuous with the premarginal carina. Postantennal region with narrow marginal carina, with enlarged postocular nodus and occipital nodus. The number and arrangement of the setae of head as described by Clay (1951). Antenna exhibits sexual dimorphism. Basal segment is about 1.5 times as long as the conus. (In the female this segment is almost as long as the conus.)

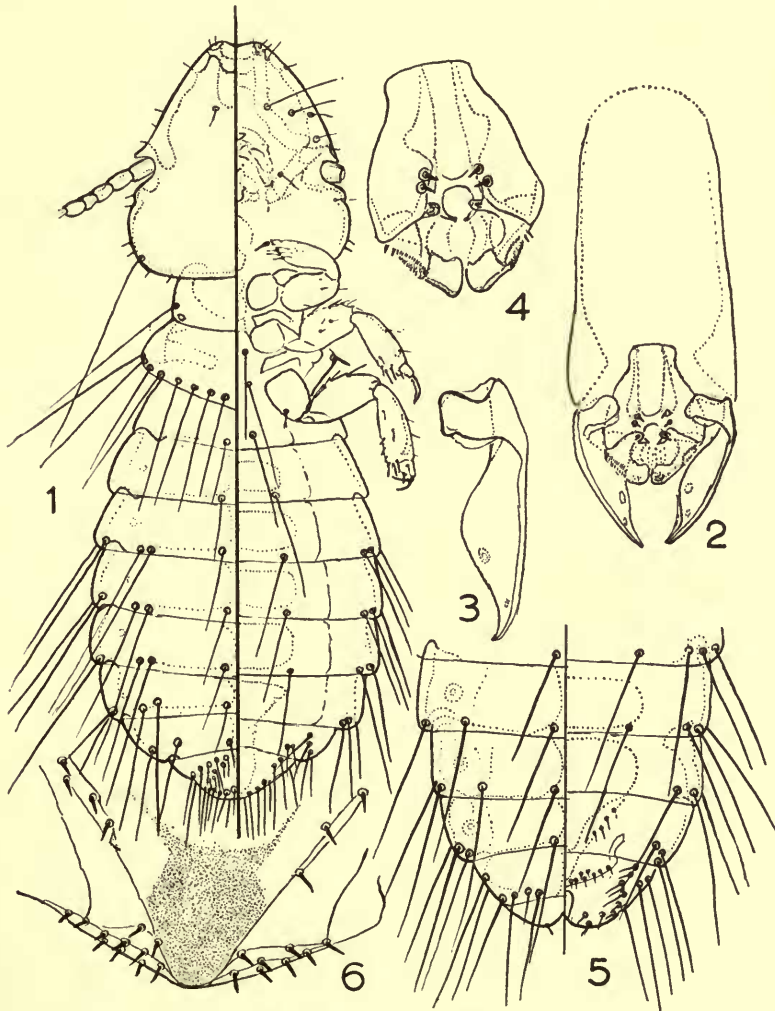
Prothorax transverse, with one long dorsal hair in the posterior angle. Pterothorax trapezoidal, broadly angled over abdomen, laterally divergent with 6–8 elongate setae on the dorsal posterior margin on each side.

Abdomen elliptical, with broadly rounded terminal segment. Segments II–VIII with approximate tergal plates, varying considerably in area and pigmentation in various specimens, usually feebly sclerotized. Sternal plates II–V fairly distinct, confined to the middle. Genital plate irregular. Chaetotaxy as shown in the figure and table below, the setae are definite in number and position except for some minute terminal hairs, which may vary slightly from specimen to specimen. Genitalia with basal plate twice as long as the parameres or its own distal width. Parameres simple, very broad in the middle and pointed apically, fitting closely to the sides of the mesosome when at rest. Mesosome much flattened, as shown in Text-fig. 4.

FEMALE. Similar to the male but the body is longer, with considerable differences in the abdominal chaetotaxy. Genital plate conical with 3–4 minute lateral spines

on segment VIII, vulva with 6-II to 8-II short and stout marginal spines arranged in 2-3 rows.

MATERIAL EXAMINED. 2 females (syntypes in Denny collection) from *Garrulus g. rufitergum*; 28 males and 59 females from *Garrulus g. rufitergum* from England;



FIGS. 1-6.—*Brüella glandarii*. (1) Male; (2) male genitalia; (3) Paramere; (4) mesosomal plates; (5) terminal segments of female; (6) vulvar chaetotaxy.

14 males and 30 females from *Garrulus g. glandarius* from Hampshire, Estonia and N.E. Poland; 7 males 10 females from *Garrulus g. theresae* from Morocco; 2 females from *Garrulus g. krynicki* from Asia Minor.

LECTOTYPE. Female (Denny Collection, slide no. 256) from *Garrulus g. rufitergum*; paratype one female.

*Abdominal Chaetotaxy*

	Male.			Female (lectotype).		
	Tergal.	Sternal.	Pleural.	Tergal.	Sternal.	Pleural.
Pterothorax . . . . .	6-8+6-8	1+1	—	7-8+7-8	1+1	—
Abdomen II . . . . .	1+1	1+1	0+0	1+1	0+0	0+0
III . . . . .	1+1	1+1	0+0	1+1	0+0	0+0
IV . . . . .	1-2+1+1+2	1+1	2+2	1+1+1+1	1+1	2+2
V . . . . .	2+1+1+2	1+1	3+3	1+1+1+1	1+1	3+3
VI . . . . .	2-3+1+1+2	1+1	4+4	1+1+1+1	1+1	3+3
VII . . . . .	1-2+1+1+2	—	4+4	1+1+1+1	—	3+3
VIII . . . . .	2+1+1+2	—	4+4	0+1+1+0	—	4+4
IX-X . . . . .	1+5+5+1	—	2+2	—	—	—
			6+13			
						Vulva 6-11+8-11
						See Text-fig. 5.

*Measurements (mm.) : Length × Breadth*

	Male.	Female (lectotype).
Head : pre-antennal . . . . .	0·198 × 0·321	0·226 × 0·369
hind head . . . . .	0·239 × 0·290	0·239 × 0·452
Prothorax . . . . .	0·103 × 0·233	0·103 × 0·274
Pterothorax . . . . .	0·171 × 0·383	0·191 × 0·390
Abdomen . . . . .	0·904 × 0·473	0·021 × 0·561
L : B of pre-antennal . . . . .	1 : 1·62	1 : 1·64
L : B of hind head . . . . .	1 : 1·63	1 : 1·89
Cephalic index . . . . .	1 : 0·89	1 : 0·97

*Brüelia glandarii perisoreus* subsp. nov.

(Text-figs. 1a, 3a)

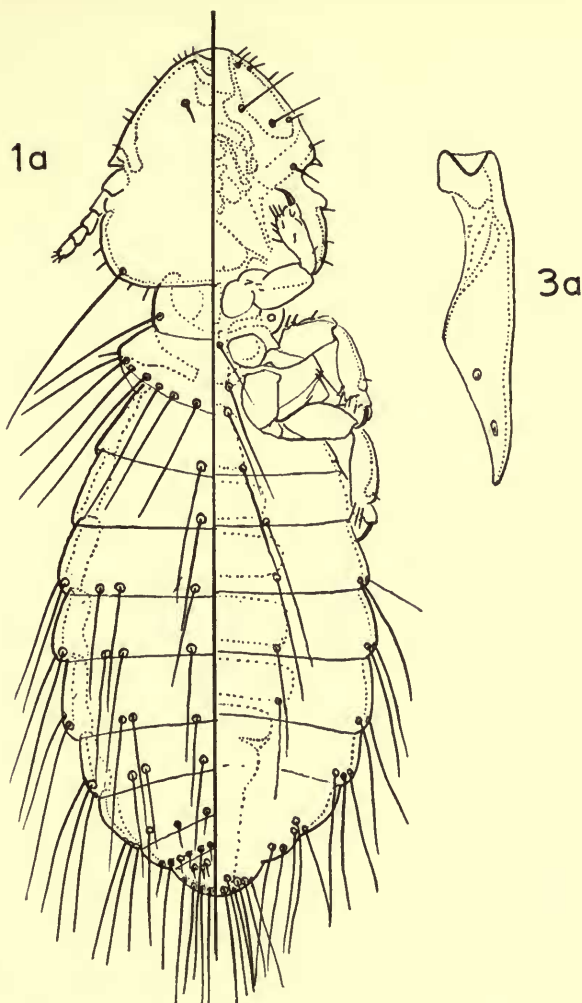
This species is allied to *Brüelia glandarii* (Denny) from which it can be separated by the shape of the pre-antennal region.

MALE. Antenna sexually dimorphic, but the difference is very slight. Tergal plates entire, feebly sclerotized. Sternal plates and genital plate well sclerotized. Details of head of parameres, shape of endomeres and of mesosome as in *Brüelia glandarii* except the parameres are not as broad and the total length is relatively longer.

FEMALE. As in *glandarii* except for shape of head.

*Measurements (mm.).*

	male (holotype).	Female (allotype).
Head : pre-antennal . . . . .	0·212 × 0·356	0·219 × 0·377
hind head . . . . .	0·205 × 0·404	0·226 × 0·417
Prothorax . . . . .	0·089 × 0·226	0·103 × 0·261
Pterothorax . . . . .	0·157 × 0·356	0·157 × 0·404
Abdomen . . . . .	0·904 × 0·561	1·321 × 0·671
L : B pre-antennal . . . . .	1 : 1·68	1 : 1·72
L : B hind head . . . . .	1 : 1·97	1 : 1·84
Cephalic index . . . . .	1 : 0·96	1 : 0·94



FIGS. 1a and 3a.—*Brüelia glandarii perisoreus* subsp. n. (1a) Male (dorsal and ventral);  
(3a) Paramere.

MATERIAL EXAMINED. 22 males and 47 females from *Perisoreus i. infaustus* (Linn.) from Lapland. *Holotype* (male) *allotype* (female) on slide no. 11103 in Meinertzhagen collection (British Museum (Nat. Hist.)), from *Perisoreus i. infaustus* from Lapland. *Paratypes*: 21 males and 46 females from the same host form (data above).

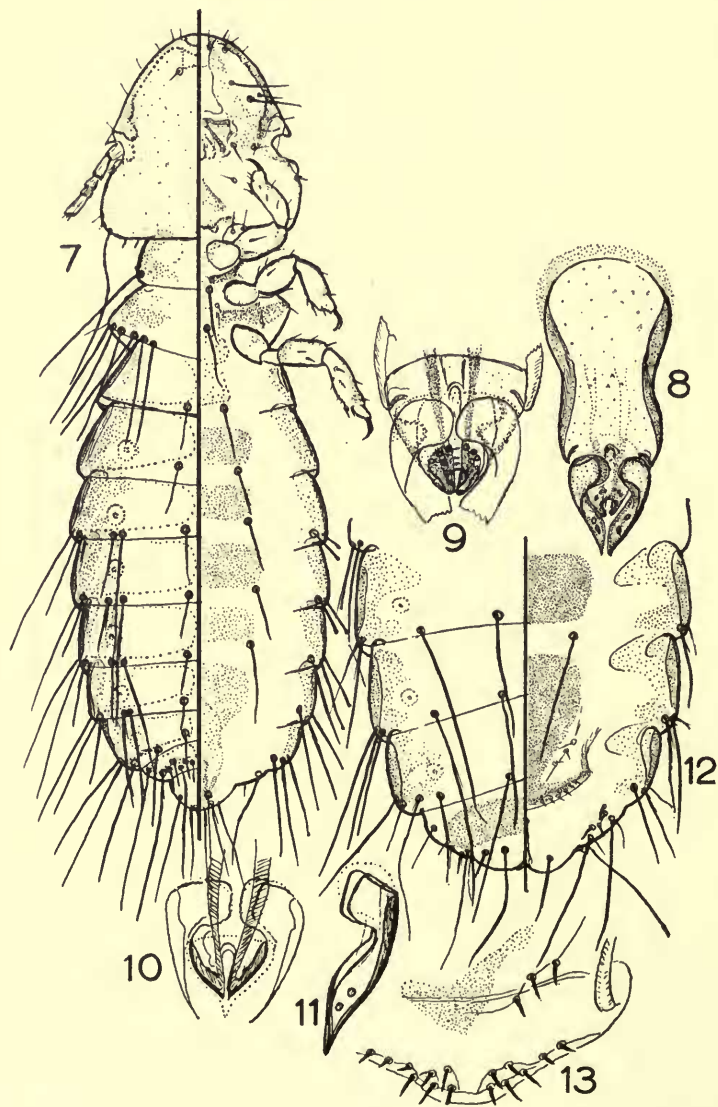
***Brüelia clayae* sp. n.**

(Text-figs. 7-13)

This species is similar to *Brüelia glandarii* (Denny) from which it can be distinguished by the male genitalia.

MALE. As shown in Text-figs. 7-II. The body plates are strongly sclerotized. Chaetotaxy as in *Brüelia glandarii*. The genitalia are well developed. The shape and details of the head of parameres, shape of endomeres and telomeres and details of mesosome are characters which distinguish it from related species.

FEMALE. No reliable character can be found on which to separate the species from the females of *Brüelia glandarii*.



FIGS. 7-13.—*Brüelia clayae* sp. nov. (7) Male; (8) Male genitalia; (9-10) two different views of mesosomal plate; (11) paramere; (12) terminal segments of female; (13) vulvar chaetotaxy.



## Measurements (mm.)

	Male (holotype).	Female (allotype).
Head : pre-antennal . . . . .	0·177 × 0·308	0·198 × 0·342
hind head . . . . .	0·205 × 0·377	0·219 × 0·411
Prothorax . . . . .	0·082 × 0·205	0·082 × 0·226
Pterothorax . . . . .	0·157 × 0·328	0·157 × 0·349
Abdomen . . . . .	0·828 × 0·479	1·109 × 0·561
L : B pre-antennal . . . . .	1 : 1·74	1 : 1·72
L : B hind head . . . . .	1 : 1·84	1 : 1·87
Cephalic index . . . . .	1 : 0·98	1 : 0·98

MATERIAL EXAMINED. 15 males, 20 females from *Cyanocitta cristata* (Linn.) from Virginia. *Holotype* (male) and *allotype* (female) on slide no. 12657-58 in Meinertzhagen collection (British Museum (Nat. Hist.)) from *Cyanocitta cristata cristata* from Virginia. *Paratypes* 14 males and 19 females from the type-host (data above).

This species is named in honour of Miss Theresa Clay, who has done much work to increase our knowledge of Mallophaga and removed so many ambiguities from the taxonomy of this group; and also given much valuable help and advice to the author during this work.

*Brüelia nitzschi* Kéler, 1938

(Text-figs. 14-20)

*Brüelia nitzschi*, Kéler, 1938, *Arb. morph. tax. Ent. Berlin-Dahlem*, 5 : 232, fig. 2.

Type host : *Cyanocorax cyanomelas* (Vieillot).

This species is similar to *Brüelia glandarii* (Denny) from which it can be distinguished by the male genitalia.

MALE. Marginal carina interrupted medianly, anterior plate well developed. Pleural plates well sclerotized, tergal plates indistinct, sternal and genital plate well developed. The characters of the head of the paramere, shape of the endomeres and telomeres and details of mesosome are typical and distinguish this species from allied forms.

FEMALE. Similar to the male, with differences in the abdominal chaetotaxy.

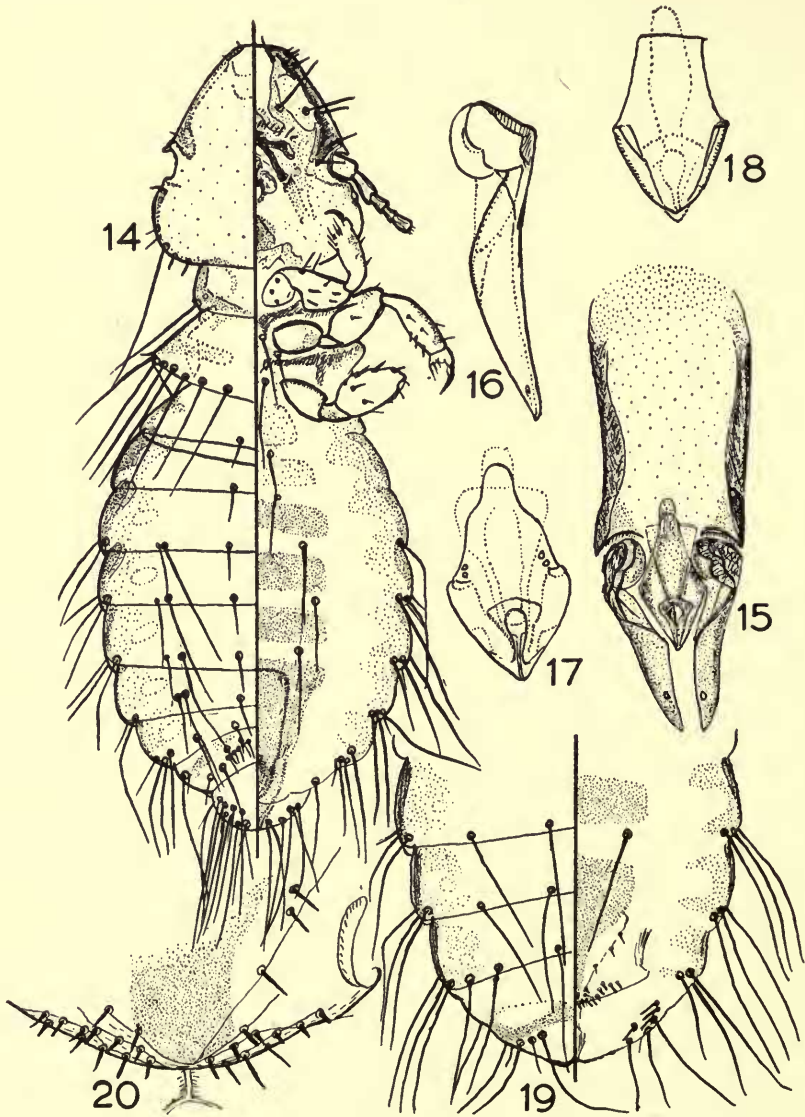
*Abdominal Chaetotaxy*

	Male.			Female.		
	Tergal.	Sternal.	Pleural.	Tergal.	Sternal.	Pleural.
Pterothorax . . . . .	6+6	1+1	—	6+6	1+1	—
Abdomen II . . . . .	1+1	1+1	0+0	1+1	1+1	0+0
III . . . . .	1+1	1+1	0+0	1+1	1+1	0+0
IV . . . . .	2+1+1+2	1+1	2+2	1+1+1+1	1+1	2+2
V . . . . .	2+1+1+2	1+1	3+3	1+1+1+1	1+1	2+2
VI . . . . .	2+1+1+2	1+1	3+3	1+1+1+1	1+1	3+3
VII . . . . .	2+1+1+2	0+0	3+3	1+1+1+1	0+0	4+4
VIII . . . . .	2+1+1+2	0+0	4+4	1+1+1+1	0+0	4+4
IX . . . . .	8+8	0+0	1+1	3+3	0+0	2+2

See Text-fig.

See Text-fig.

Vulva : 10+13



FIGS. 14-20.—*Brüelia nitzschi*. (14) Male ; (15) male genitalia ; (16) paramere ; (17-18) two different views of mesosomal plate ; (19) terminal segments of female ; (20) vulvar chaetotaxy

## Measurements (mm.)

	Male.	Female.
Head : pre-antennal . . . . .	0·177 × 0·321	0·191 × 0·369
hind head . . . . .	0·233 × 0·383	0·239 × 0·438
Prothorax . . . . .	0·082 × 0·239	0·103 × 0·281
Pterothorax . . . . .	0·171 × 0·417	0·219 × 0·431
Abdomen . . . . .	0·821 × 0·582	1·233 × 0·698
L : B pre-antennal . . . . .	1 : 1·81	1 : 1·93
L : B hind head . . . . .	1 : 1·64	1 : 1·83
Cephalic index . . . . .	1 : 0·93	1 : 1·02

MATERIAL EXAMINED.—5 males and 5 females from the type host *Cyanocorax cyanomelas* (Vieillot) from Brazil in British Museum (Nat. Hist.) collection.

*Brüelia hopkinsi* sp. nov.

(Text-figs. 21-27)

This species is close to *Brüelia glandarii* (Denny) from which it can be distinguished by the chaetotaxy which tends to be more sparse in this species, by the male genitalia and female genital plate.

MALE. Marginal carina entire, medianly less heavily sclerotized and indented, anterior margin hyaline. Ventral carina feeble. Pleural plates well developed, tergal plates and sternal plates well marked. Genitalia as shown in Text-figs. 22-25.

FEMALE. Similar to the male but varies in size and abdominal chaetotaxy.

## Abdominal Chaetotaxy

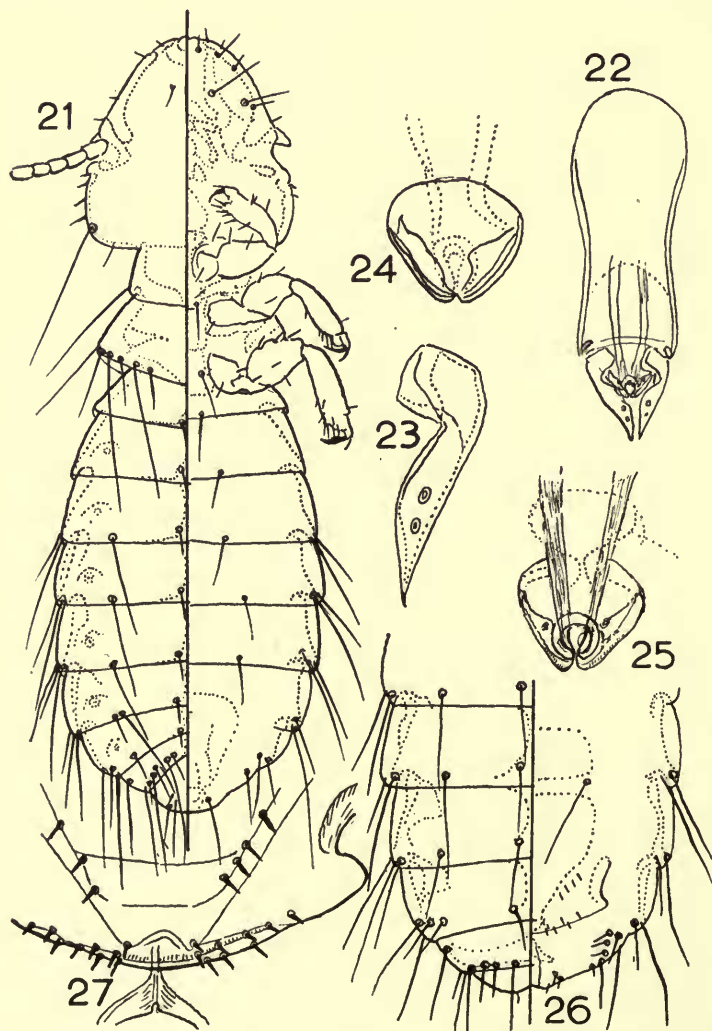
	Male.			Female.		
	Tergal.	Sternal.	Pleural.	Tergal.	Sternal.	Pleural.
Pterothorax . . . . .	5-5+5-6	1+1	—	5-6+5-6	1+1	—
Abdomen II . . . . .	1+1	1+1	0+0	1+1	1+1	0+0
III . . . . .	1+1	1+1	0+0	1+1	1+1	0+0
IV . . . . .	1+1+1+1	1+1	2+2	1+1+1+1	1+1	3+3
V . . . . .	1+1+1+1	1+1	2+2	1+1+1+1	1+1	3+3
VI . . . . .	1+1+1+1	1+1	3+3	1+1+1+1	1+1	3+3
VII . . . . .	2+1+1+2	0+0	3+3	1+1+1+1	0+0	2+3
VIII . . . . .	1+1+1+1	0+0	3+3	1+1+1+1	0+0	3+3
IX . . . . .	7+7	0+0	1+1	4+4	0+0	3+3
X-XI . . . . .	3+3	—	6+7	—	—	—

See Text-fig.

Vulva : 9+10 setae.

## Measurements (mm.)

	Male (holotype).	Female (allotype).
Head : pre-antennal . . . . .	0.191 × 0.315 . . . . .	0.198 × 0.335 . . . . .
hind head . . . . .	0.191 × 0.363 . . . . .	0.212 × 0.417 . . . . .
Prothorax . . . . .	0.089 × 0.212 . . . . .	0.123 × 0.253 . . . . .
Pterothorax . . . . .	0.151 × 0.321 . . . . .	0.157 × 0.377 . . . . .
Abdomen . . . . .	0.842 × 0.473 . . . . .	0.123 × 0.534 . . . . .
L : B pre-antennal . . . . .	1 : 1.64 . . . . .	1 : 1.69 . . . . .
L : B hind head . . . . .	1 : 1.90 . . . . .	1 : 1.96 . . . . .
Cephalic index . . . . .	1 : 0.95 . . . . .	1 : 1.02 . . . . .



FIGS. 21-27.—*Brüella hopkinsi* sp. nov. (21) Male; (22) male genitalia; (23-25) two different views of mesosomal plate; (26) terminal segments of female; (27) vulvar chaetotaxy.

MATERIAL EXAMINED. 3 males and 4 females from *Xanthoura yncas galeata* Ridgway from Colombia. *Holotype* (male), *allotype* (female) slide no. 4077 in Meinertzhagen collection (British Museum (Nat. Hist.)) from *Xanthoura yncas galeata* from Colombia. *Paratypes* 2 males and 3 females from type host (data above).

This species is named in honour of G. H. E. Hopkins as a modest recognition of his outstanding work on Phthiraptera and also to acknowledge my gratitude for the constant help I have received from him since I started work on Mallophaga.

*Brüelia meinertzhageni* sp. nov.

(Text-figs. 28-34)

This species is also very similar to *Brüelia glandarii* (Denny) from which it can be distinguished by the larger size, male chaetotaxy and genitalia.

MALE. Marginal carina interrupted medially and laterally. Anterior plate well marked. Dorsal suture distinct. Ventral carina feebly sclerotized. Tergal plates interrupted in the middle. Male genitalia as shown in Text-figs. 29-32. Details of the head of the parameres and of the mesosome distinguish it from allied forms. The dorsal setae in this species tend to be more numerous than in *Brüelia glandarii*.

FEMALE. Similar to male but with scarce dorsal abdominal chaetotaxy.

*Abdominal Chaetotaxy*

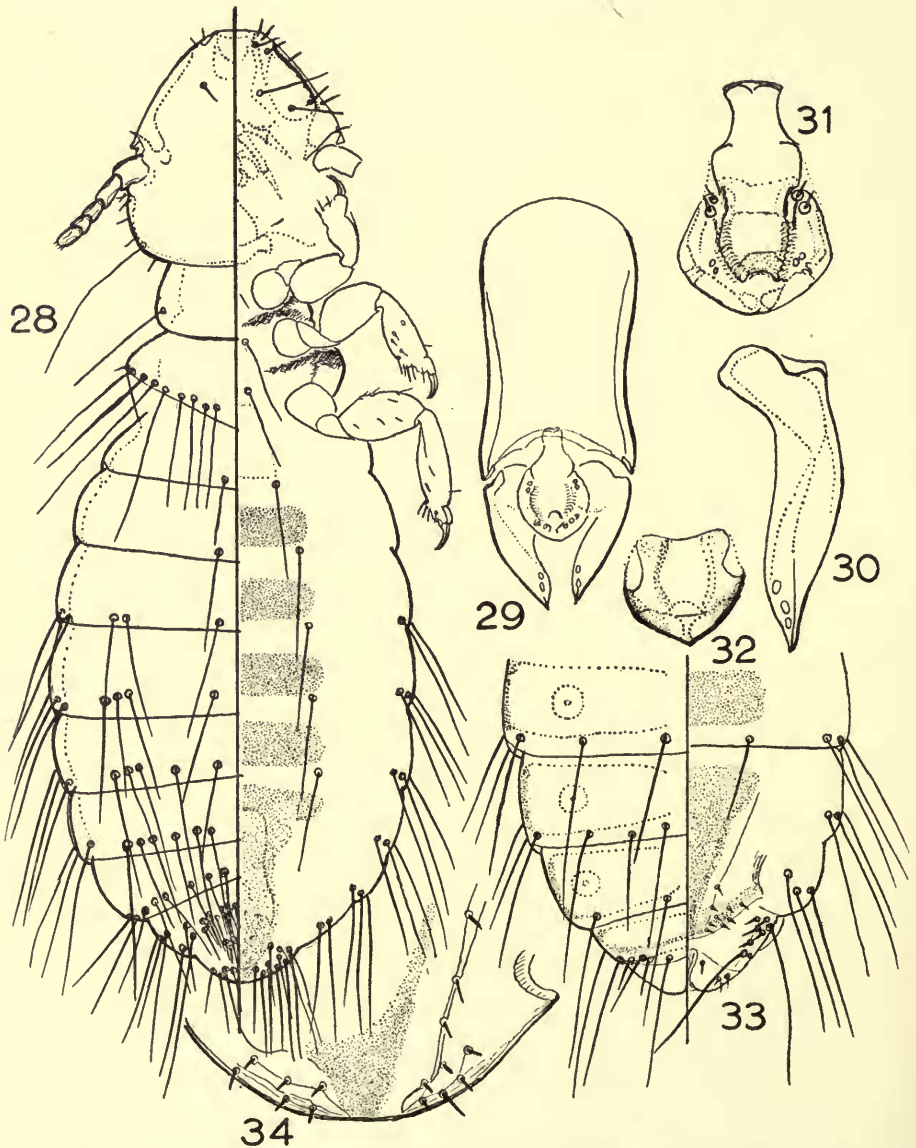
	Male.			Female.		
	Tergal.	Sternal.	Pleural.	Tergal.	Sternal.	Pleural.
Pterothorax . . . . .	7-8+7-8	1+1	--	7+8	1+1	—
Abdomen II . . . . .	1+1	1+1	0+0	1+1	1+1	0+0
III . . . . .	1+1	1+1	0+0	1+1	1+1	1+1
IV . . . . .	2-3+1+1+2-3	1+1	2+2	1+1+1+1	1+1	2+2
V . . . . .	2-3+1+1+2-3	1+1	3+3	1+1+1+1	1+1	2+2
VI . . . . .	3+1-2+1-2+2-3	1+1	3+3	1+1+1+1	1+1	3+3
VII . . . . .	3+2+2+3	0+0	3+3	1+1+1+1	0+0	3+3
VIII . . . . .	3+2-3+2-3+3	0+0	3+3	1+1+1+1	0+0	3+3
IX . . . . .	/3+11-12	3+0	4+4	1+2+2+1	0+0	3+3
X-XI . . . . .	See Text-fig.			See Text-fig.		

Vulva 6-8 setae.

*Measurements (mm.)*

	Male (holotype).	Female (allotype).
Head : pre-antennal . . . . .	0.205 × 0.363	0.205 × 0.383
hind head . . . . .	0.219 × 0.417	0.239 × 0.404
Prothorax . . . . .	0.103 × 0.261	0.103 × 0.246
Pterothorax . . . . .	0.191 × 0.411	0.171 × 0.383
Abdomen . . . . .	1.062 × 0.616	1.308 × 0.631
L : B pre-antennal . . . . .	1 : 1.77	1 : 1.87
L : B hind head . . . . .	1 : 1.90	1 : 1.67
Cephalic index . . . . .	1 : 0.98	1 : 0.91

MATERIAL EXAMINED. 17 males and 37 females from *Dendrocitta rufa vagabonda* (Latham) from Nepal, Burma and Decan. *Holotype* (male), *allotype* (female) on slide no. 4061 from *Dendrocitta rufa vagabonda* from Burma in the Meinertzhagen collection (British Museum (Nat. Hist.)). *Paratypes* 16 males and 36 females from the type host (data above).



FIGS. 28-34.—*Brüelia meinertzhageni* sp. nov. (28) Male; (29) male genitalia; (30) paramere; (31-32) two different aspects of mesosomal plate; (33) terminal segments of female; (34) vulvar chaetotaxy.

This species is named in honour of Col. R. Meinertzhagen, who built up a Mallophagan collection, now at the British Museum, which is second to none.

*Briëlia husaini* sp. nov.

(Text-figs. 35-43)

This species is close to *Briëlia glandarii* (Denny) from which it can be distinguished by the shape of the head and chaetotaxy of segment IX.

MALE. Head, thorax and abdomen as in *Briëlia glandarii*. Tergal plates entire, feebly sclerotized. Sternal plates IV-VI distinct, confined to the middle. Abdominal chaetotaxy as given in table below. Genitalia as shown in the Text-figs. 38-41. Mesosome more or less polygonal in outline; head of paramere well developed.

FEMALE. Similar to the male but differs in dorsal chaetotaxy and in being larger.

*Abdominal Chaetotaxy*

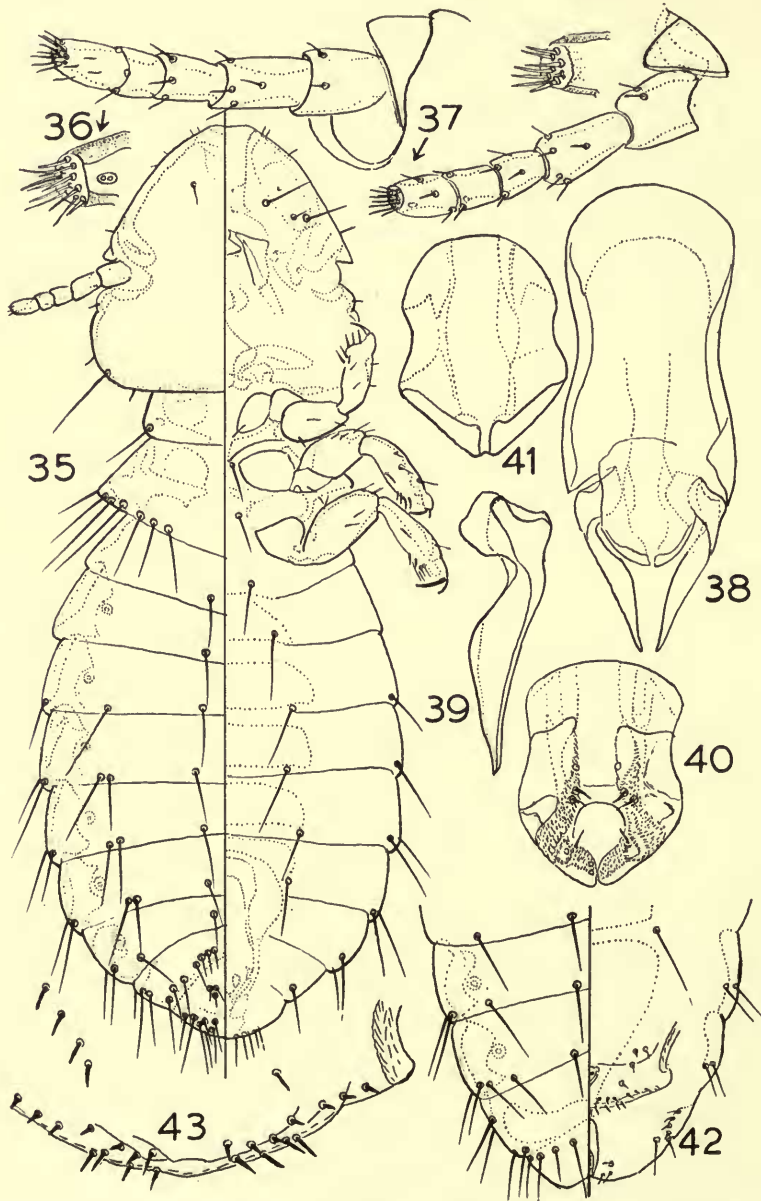
	Male.			Female.		
	Tergal.	Sternal.	Pleural.	Tergal.	Sternal.	Pleural.
Pterothorax .	6-8+6-8	1+1	—	7-8+7-8	1+1	—
Abdomen II .	1+1	1+1	0+0	1+1	1+1	0+0
III .	1+1	1+1	0+0	1+1	1+1	0+0
IV .	1+1+1+0	1+1	1+1	1+1+1+1	1+1	1+1
V .	2+1+1+2	1+1	1+1	1+1+1+1	1+1	2+2
VI .	2+1+1+2	1+1	1+2	1+1+1+1	1+1	3+2
VII .	2+1+1+2	0+0	1+2	1+1+1+1	0+0	3+3
VIII .	1+1+1+1	0+0	2+2	1+1+1+1	0+0	3+4
IX .	1-2+3-5+3-5+1-2	0+0	1+1	3+3	0+0	2+2
X-XI .	3+3	0+0	6-9	—	—	—
				Vulva : 10-18+10-13		

*Measurements (mm.)*

	Male (holotype).	Female (allotype).
Head : pre-antennal .	0.246 × 0.411	0.253 × 0.452
hind head .	0.239 × 0.479	0.253 × 0.521
Prothorax . . .	0.109 × 0.287	0.096 × 0.301
Pterothorax . . .	0.212 × 0.452	0.191 × 0.466
Abdomen . . .	0.965 × 0.651	1.116 × 0.686
L : B pre-antennal .	1 : 1.69	1 : 1.78
L : B hind head . .	1 : 1.97	1 : 2.06
Cephalic index . .	1 : 0.97	1 : 1.03

MATERIAL EXAMINED. 6 males, 17 females from *Urocissa flavirostris cucullata* from Kashmir in Meinertzhagen collection (British Museum (Nat. Hist.)), Kulu in Ansari Collection. 5 males and 5 females from *Urocissa melanocephala occipitalis* from Nepal in Meinertzhagen collection and Kulu in Ansari Collection.

*Holotype* (male) and *allotype* (female) on slide no. 944 in Meinertzhagen collection from *Urocissa flavirostris cucullata* Gould, from Kashmir. *Paratypes* 5 males and 16 females from same host (data above).



FIGS. 35-43.—*Brüelia husaini* sp. nov. (35) Male; (36) male antenna; (37) female antenna; (38) male genitalia; (39) parameres; (40-41) two different aspects of mesosomal plate; (42) terminal segments of female; (43) vulvar chaetotaxy.



This species is named in honour of my former Professor M. Afzal Husain who always took a keen interest in my work and gave me instructions, help and encouragement from the day I started under him as his pupil.

*Brüelia deficiens* (Piaget), 1885

(Text-figs. 51-56\*)

*Nirmus deficiens* Piaget, 1885, *Pédiculines Supplement* : 23, pl. 3, fig. 3.

Type host : *Cyanopica cyanus cooki* Bonaparte

Unlike the previous species of *Brüelia* described from Corvidae, this species is delicate and feebly sclerotized and resembles those forms which infest passerines belonging to the families Fringillidae, Laniidae, Timaliidae and Sturnidae.

MALE. Marginal carina indented medially and the anterior margin of the head at this point hyaline. Abdominal chaetotaxy sparse, delicate and often seen with difficulty. Tergal plates feebly sclerotized. Sternal plates IV-VI distinct, sclerotized as two transverse components, giving an impression of two sternal plates to each segment. Genitalia delicate and typical for the species.

FEMALE. Similar to the male but the measurements are greater. Genital plate is polygonal, shield-shaped with acutely angulate posterior angle.

*Abdominal Chaetotaxy*

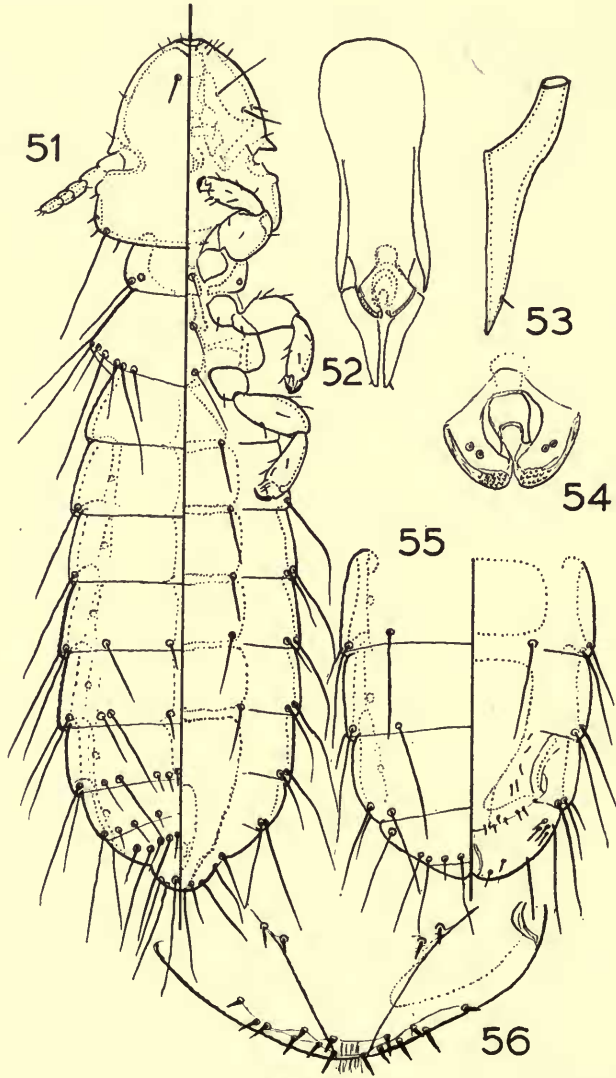
	Male.			Female.		
	Tergal.	Sternal.	Pleural.	Tergal.	Sternal.	Pleural.
Pterothorax .	5-6+5-6	1+1	—	5-6+5-6	1+1	—
Abdomen II .	0+0	1+1	0+0	0+0	1+1	0+0
III .	0+0	1+1	1-0+1-0	0+0	1+1	1+1
IV .	0+0	1+1	2+2	0+0	1+1	2+2
V .	1+1+1+1	1+1	2+2	0+0	1+1	2+2
VI .	2+1+1+2	1+1	2+2	1+1	1+1	2+2
VII .	2+3+2+2	0+0	2+2	1+1	0+0	2+2
VIII .	2+2+2+2	0+0	2+2	1+1	0+0	3+3
IX .	4-5+4-5	0+0	2+2	1+3+3+1	0+0	2+2
X-XI .	See Text-fig.			Vulva : 7+8 marginal hairs.		

*Measurements (mm.)*

	Male (type).	Female.
Head : pre-antennal .	0.184 × 0.281	0.226 × 0.308
hind head .	0.191 × 0.328	0.198 × 0.356
Prothorax . . . . .	0.089 × 0.212	0.103 × 0.233
Pterothorax . . . . .	0.171 × 0.321	0.191 × 0.356
Abdomen . . . . .	0.952 × 0.404	1.301 × 0.445
L : B pre-antennal .	1 : 1.52	1 : 1.37
L : B hind head . . . . .	1 : 1.71	1 : 1.79
Cephalic index . . . . .	1 : 0.87	1 : 0.84

\* Owing to the rearrangement of Text-figures there are none under the numbers 44-50.

MATERIAL EXAMINED. Piaget's collection: one male (type) from *Cyanopica cyanus cooki* Bonaparte. 3 males and 3 females from the type host from Spain in Meinertzhagen collection (British Museum (Nat. Hist.)).



FIGS. 51-56.—*Brüelia deficiens*. (51) Male; (52) male genitalia; (53) paramere; (54) mesosomal plate; (55) terminal segments of female; (56) vulvar chaetotaxy.

Three males and 13 females from *Aphelocoma c. californica* from California; 9 males and 30 females from *Cyanocitta stelleri frontalis* from California in Meinertzhagen collection were found to be indistinguishable from *Brüelia deficiens*. Some

specimens had slightly narrower heads but this was not found to be a regular feature in all the specimens from the same host.

One male and two females (syntypes) of *Brüelia ampullata* (Piaget) in Piaget's collection from *Cyanopica cyanus cooki* were critically compared with *Brüelia deficiens* and found to agree with it in all respects. These two names were published in the same publication and *deficiens* has page priority.

Lectotype of *Brüelia deficiens* (Piaget) : ♂ in the Piaget Collection (British Museum (Nat. Hist.)), slide no. 1237.

Lectotype of *Brüelia ampullatus* (Piaget) : ♂ in the Piaget Collection (British Museum (Nat. Hist.)), slide no. 1180.

*Brüelia zavattariornis* sp. nov.

(Text-figs. 57-62)

This species is very similar to *Brüelia deficiens* (Piaget) and is difficult to distinguish on a superficial examination. A segment to segment examination, however, shows that the following characters warrant its separation. The male has a narrower head ; other measurements also tend to be smaller ; the chaetotaxy is of a distinct pattern ; the genitalia are similar, but in this species the parameres are shorter.

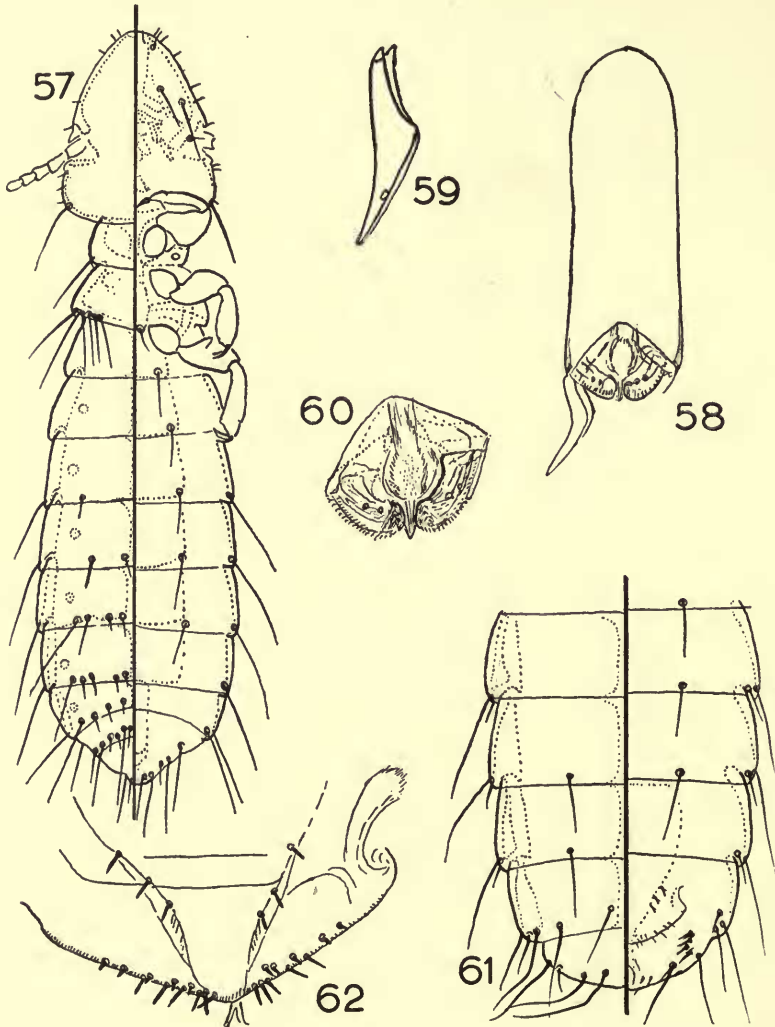
*Abdominal Chaetotaxy*

	Male (holotype).			Female (allotype).		
	Tergal.	Sternal.	Pleural.	Tergal.	Sternal.	Pleural.
Pterothorax .	6+6	1+1	—	6+6	1+1	—
Abdomen :						
II .	0+0	1+1	0+0	0+0	1+1	0+0
III .	0+0	1+1	0+0	0+0	1+1	0+0
IV .	1+1	1+1	1+1	0+0	1+1	1+1
V .	1+1+1+1	1+1	1+1	0+0	1+1	1+1
VI .	2+2+2+2	1+1	2+1	1+1	1+1	1+1
VII .	1+4+4+1	0+0	1+1	1+1	0+0	2+2
VIII .	1+3+3+1	0+0	2+2	1+1+1+1	0+0	3+3
IX .	1+2+1+1+1+1+1+3+1	0+0	2+2	1+2+2+1	0+0	3+3
X-XI .	1+1	0+0	2+3	—	—	—
				Vulva 10+9-10		

*Measurements (mm.)*

	Male (holotype).	Female (allotype).
Head : pre-antennal .	0.184 × 0.246	0.191 × 0.281
hind head .	0.157 × 0.274	0.177 × 0.315
Prothorax . . . . .	0.082 × 0.184	0.082 × 0.191
Pterothorax . . . . .	0.116 × 0.267	0.150 × 0.301
Abdomen . . . . .	0.891 × 0.377	1.164 × 0.507
L : B pre-antennal .	1 : 1.34	1 : 1.47
L : B hind head . . . . .	1 : 1.74	1 : 1.83
Cephalic index . . . . .	1 : 0.80	1 : 0.85

Female is similar to *B. deficiens* but is smaller. No other reliable characters could be detected to separate the two allied forms.



FIGS. 57-62.—*Brüella zavattariornis* sp. nov. (57) Male; (58) male genitalia; (59) paramere; (60) mesosomal plate; (61) terminal segments of female; (62) vulvar chaetotaxy.

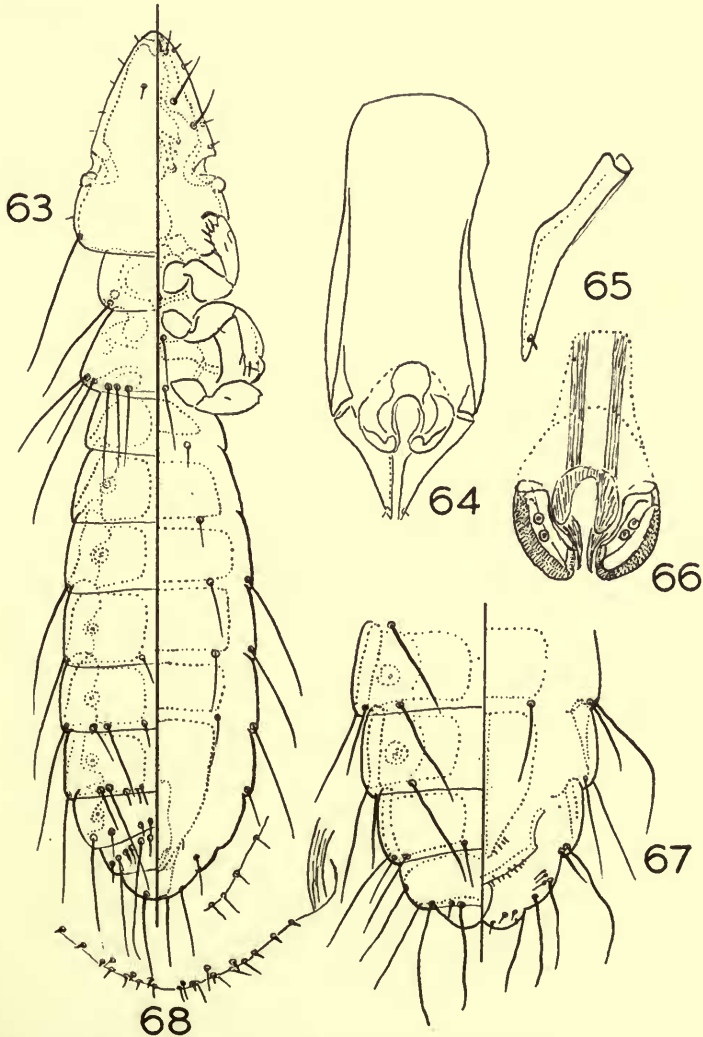
MATERIAL EXAMINED. 8 males and 21 females from *Zavattariornis stressemanni* Moloni from Yavallo, South Abyssinia. *Holotype* (male), *allotype* (female) on slide number 16129 in Meinertzhagen collection (British Museum (Nat. Hist.)) from *Zavattariornis stressemanni*. *Paratypes* 7 males and 20 females from type host, same data as above.

*Brüelia zohrae* sp. nov.

(Text-figs. 63-68)

This species is similar to *Brüelia deficiens* (Piaget) and *B. zavattariornis* sp. nov., from both of which it can be easily separated by its pointed wedge-shaped head and dorsal abdominal chaetotaxy.

MALE. Head with acutely pointed forehead. Marginal carina indented medially and the anterior margin at this point hyaline. Tergal plates squarish and approximated sternal plates transverse. The dorsal abdominal hairs delicate. It is often



FIGS. 63-68.—*Brüelia zohrae*. (63) Male; (64) male genitalia; (65) paramere; (66) mesosomal plate; (67) terminal segments of female; (68) vulvar chaetotaxy.

difficult to ascertain the position of a hair if lost, because the pustules are not very conspicuous.

FEMALE. Similar to the male but differs in measurements and abdominal chaetotaxy.

*Abdominal Chaetotaxy*

		Male (holotype).			Female (allotype).		
		Tergal.	Sternal.	Pleural.	Tergal.	Sternal.	Pleural.
Pterothorax	.	6+6	1+1	—	6+6	1+1	—
Abdomen	II .	0+0	1+1	0+0	0+0	1+1	0+0
	III .	0+0	1+1	0+0	0+0	1+1	1+1
	IV .	0+0	1+1	2+2	0+0	1+1	2+2
	V .	1+1	1+1	2+2	1+1	1+1	2+2
	VI .	2+1-2+1-2+2	1+1	2+2	1+1	1+1	2+2
	VII .	2+4+3+2	0+0	1+1	1+1	0+0	3+3
	VIII .	1+3+3+1	0+0	1+1	1+1+1+1	0+0	2+2
	IX .	5-6+5	—	—	3+3	0+0	3+3
	X-XI .	See Text-fig.	See Text-fig.	.	—	—	—

Vulva : 10+9-11

*Measurements (mm.)*

	Male (holotype).	Female (allotype).
Head : pre-antennal .	0.226 × 0.281	0.212 × 0.308
hind head .	0.171 × 0.369	0.177 × 0.383
Prothorax .	0.096 × 0.294	0.103 × 0.308
Pterothorax .	0.131 × 0.363	0.177 × 0.411
Abdomen .	0.917 × 0.424	1.177 × 0.514
L : B pre-antennal .	1 : 1.24	1 : 1.45
L : B hind head .	1 : 2.15	1 : 2.15
Cephalic index .	1 : 0.93	1 : 0.98

MATERIAL EXAMINED. 2 males and 8 females from *Philostomus afer* (Linn.) from Portuguese Guinea. *Holotype* (male) and *allotype* (female) on slide no. 4064 in Meinertzhagen collection from *Philostomus afer*. *Paratypes* one male and 7 females from the same host (data above).

This species is named after my wife, who was responsible for my stay in London, and ungrudgingly shouldered the responsibilities of the children during my time in Europe.

*Brüelia biguttata* (Kellogg & Paine), 1914

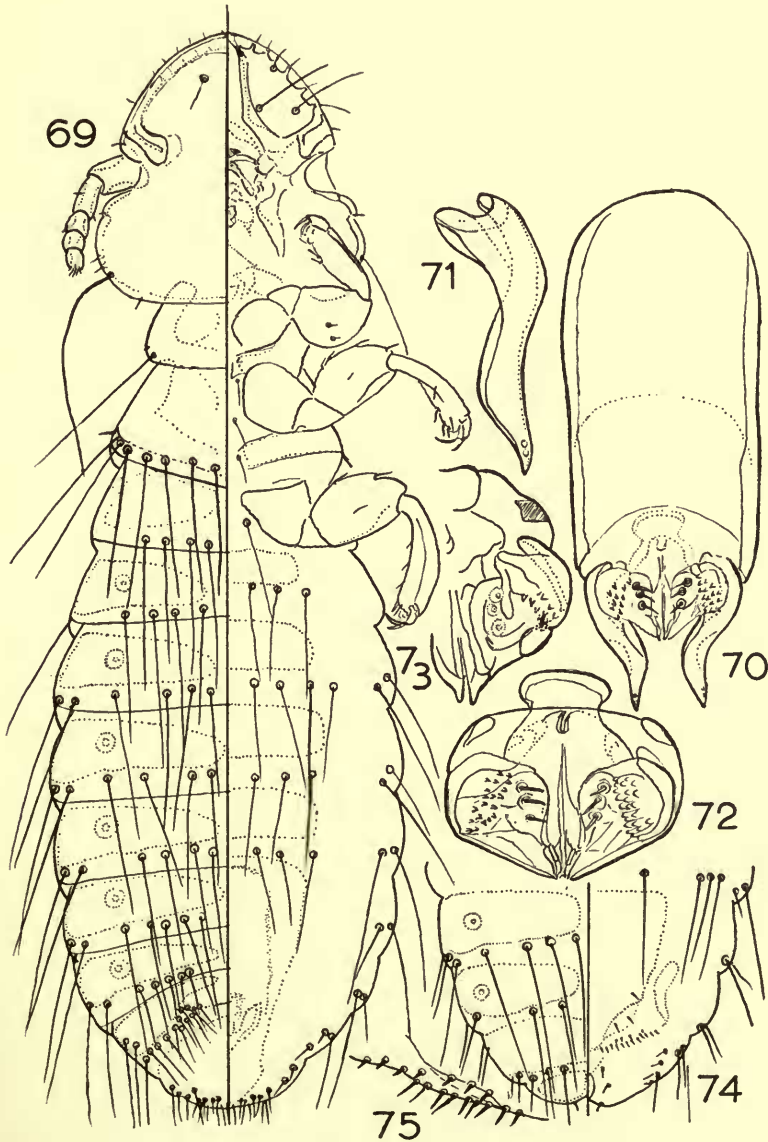
(Text-figs. 69-75)

*Nirmus biguttatus* Kellogg & Paine, 1914, *Rec. Ind. Mus.* 10 : 234, pl. 14, fig. 2.

Type host : *Pyrrhocorax g. graculus* (Linn.).

MALE. Pre-antennal region with marginal carina entire. Ventral carina sclerotized only proximally. Basal antennal segment robust, about 1.5 times as broad as the segment before.

Pterothorax with 7-8 elongate setae on the dorsal posterior margin on each side. Segments II-IX with approximate tergal plates. Sternal plates II-V well sclerotized. Terminal margin with 13-14 long hairs. Genitalia with basal plate about three times as long as mesosome and 2.5 times as long as its distal width.



FIGS. 69-75.—*Brüelia biguttata*. (69) Male; (70) male genitalia; (71) parameres; (72-73) two different aspects of mesosomal plate; (74) terminal tegments of female; (75) vulvar chaetotaxy.

FEMALE. Similar to the male. Basal antennal segment almost half the size of the corresponding segment in male. Genital plate with 3-4 minute spines. Vulva with 15-16 short marginal spines arranged in two irregular rows.

	<i>Abdominal Chaetotaxy</i>					
	Male.			Female, slide no. 822.		
	Tergal.	Sternal.	Pleural.	Tergal.	Sternal.	Pleural.
Pterothorax . . .	8-9+8-9	2+2	—	7-8+7-8	1+1	—
Abdomen :						
II . . .	1+2-3+3+1	2+2	0+0	1+2+2+1	1+1	0+0
III . . .	1+3+3+1	2+3-4	1+1	1+2+2+1	1+2+2+1	1+1
IV . . .	1+3+3+1	1+2+2+1	2+2	1+2+2+1	1+1+1+1	2+2
V . . .	1+3-4+4+1	1+2+2+1	2+2	1+2+2+1	2+1+1+2	2+2
VI . . .	1+4+4+1	1+1+1+1	2+2-3	1+3+3+1	3+1+1+4	3+3
VII . . .	1+4-6+6+1	0+0	3+3	1+3+3+1	1+0+0+0	3+3
VIII . . .	5+5	0+0	3+3	1+2+2+1	0+0	3+3
IX . . .	10+9	0+0	3+3	3+0+0+3	0+0	5+5
X-XI . . .	See Text-fig.			—	—	—

Vulva : 15+16 marginal hairs.

### Measurements (mm.)

	Male (lectotype).	Female, slide no. 822.
Head : pre-antennal . . .	0.198 × 0.377	0.212 × 0.383
hind head . . .	0.274 × 0.472	0.246 × 0.445
Prothorax . . .	0.116 × 0.293	0.096 × 0.260
Pterothorax . . .	0.191 × 0.431	0.205 × 0.404
Abdomen . . .	1.075 × 0.623	1.061 × 0.630
L : B pre-antennal . . .	1 : 1.90	1 : 1.81
L : B hind head . . .	1 : 1.72	1 : 1.80
Cephalic index . . .	1 : 1.0	1 : 0.97

MATERIAL EXAMINED. 2 male syntypes, Kellogg collection, Indian Museum, Calcutta. 5 males and 10 females from the type host, *Pyrrhonorax g. graculus* (Linn.) from Khambajon (Tibet) and Pyrenees.

LECTOTYPE. 1 male on slide no 513/16 in Indian Museum, Calcutta.

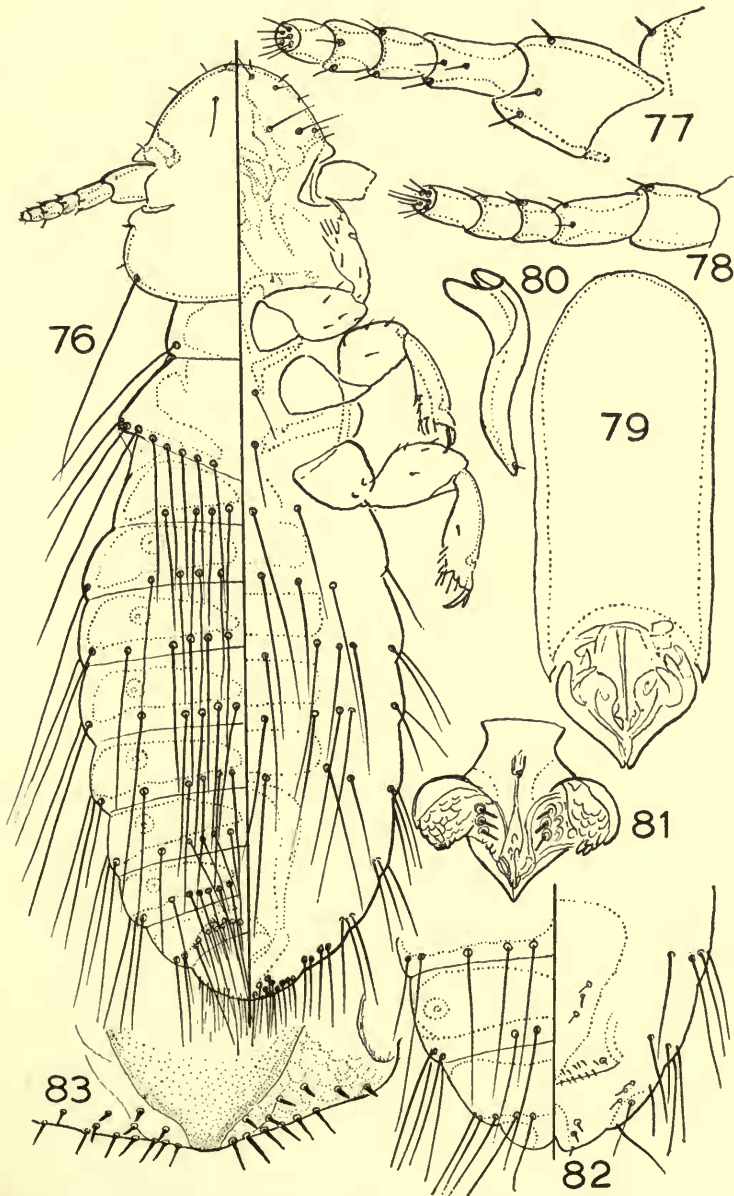
Material collected from *Pyrrhonorax p. pyrrhonorax* from Pyrenees and Crete, *Pyrrhonorax p. himalayanus* from Afghanistan and *Pyrrhonorax p. pontifex* from East Persia in Meinertzhagen collection is indistinguishable from *Brüelia biguttata* (Kellogg & Paine). Some of the specimens show marked differences in the shape of the head, abdominal chaetotaxy and total length, but there are intermediate forms showing that this species exhibits an unusually large range of variation. The form described below shows constant differences which warrant its description as a new sub-species of *Brüelia biguttata* (Kellogg & Paine).



*Brüelia biguttata docilis* subsp. nov.

(Text-figs. 76-83)

MALE. Similar to *Brüelia biguttata* (Kellogg & Paine) but the head is of slightly smaller size, marginal carina comparatively narrower, ventral carina sclerotized as



FIGS. 76-83.—*Brüelia biguttata* subsp. *docilis*. (76) Male; (77) male antenna; (78) female antenna; (79) male genitalia; (80) paramere; (81) mesosomal plate; (82) terminal segments of female; (83) vulvar chaetotaxy.

far as the middle of the pre-antennal region. The genitalia with proportionately smaller parameres.

FEMALE. Similar to *Brüelia biguttata*, but differs in abdominal chaetotaxy.

Ptero- thorax Abdomen :	Abdominal Chaetotaxy					
	Male.			Female.		
	Tergal.	Sternal.	Pleural.	Tergal.	Sternal.	Pleural.
	8+8	1+1	—	7+7	1+1	—
II	1+3+3+0	1+1+1-1	0+0	1+3+3+1	1+1	0+0
III	1+4+5+1	1+2+2+1	1+1	1+3+3+1	1+4+4+1	1+1
IV	1+4-5+4+1	2+3+3+2	2+2	1+3+3+1	1+2+2+1	2+2
V	1+4+4+1	1+2+2+1	2+2	1+3+3+1	1+2+2+1	3+3
VI	1+4+4+1	1+2+2+1	3+3	1+2-3+2-3+1	3+4+3+4	3+3
VII	1+4-5+4-5+1	0+0	3+3	1+3+3+1	0+0	3+2
VIII	1+4-5+5+1	0+0	3+3	0-1+2-3+2-3+1-0	0+0	3+3
IX	1+11+10+1	0+0	3+3	3+3	0+0	4-5+4-5
X-XI	—	—	14+19	—	—	—

Vulva 12+12

#### Measurements (mm.)

	Male (holotype).	Female (allotype).
Head : pre-antennal . . .	0.171 × 0.328	0.219 × 0.363
hind head . . .	0.253 × 0.411	0.274 × 0.411
Prothorax . . .	0.103 × 0.253	0.103 × 0.239
Pterothorax . . .	0.137 × 0.404	0.177 × 0.411
Abdomen . . .	1.007 × 0.589	1.500 × 0.630
L : B pre-antennal . . .	1 : 1.91	1 : 1.66
L : B hind head . . .	1 : 1.62	1 : 1.50
Cephalic index . . .	1 : 0.97	1 : 0.83

MATERIAL EXAMINED. 22 males and 31 females from *Pyrrhocorax p. docilis* (Gmelin) in Meinertzhagen collection (British Museum (Nat. Hist.)). *Holotype* (male) and *allotype* (female) on slide no. 12439 from *Pyrrhocorax p. docilis* from Morocco in Meinertzhagen collection. *Paratypes* 21 males and 30 females from the same host (data above).

#### *Brüelia koslovae* (Clay,) 1936

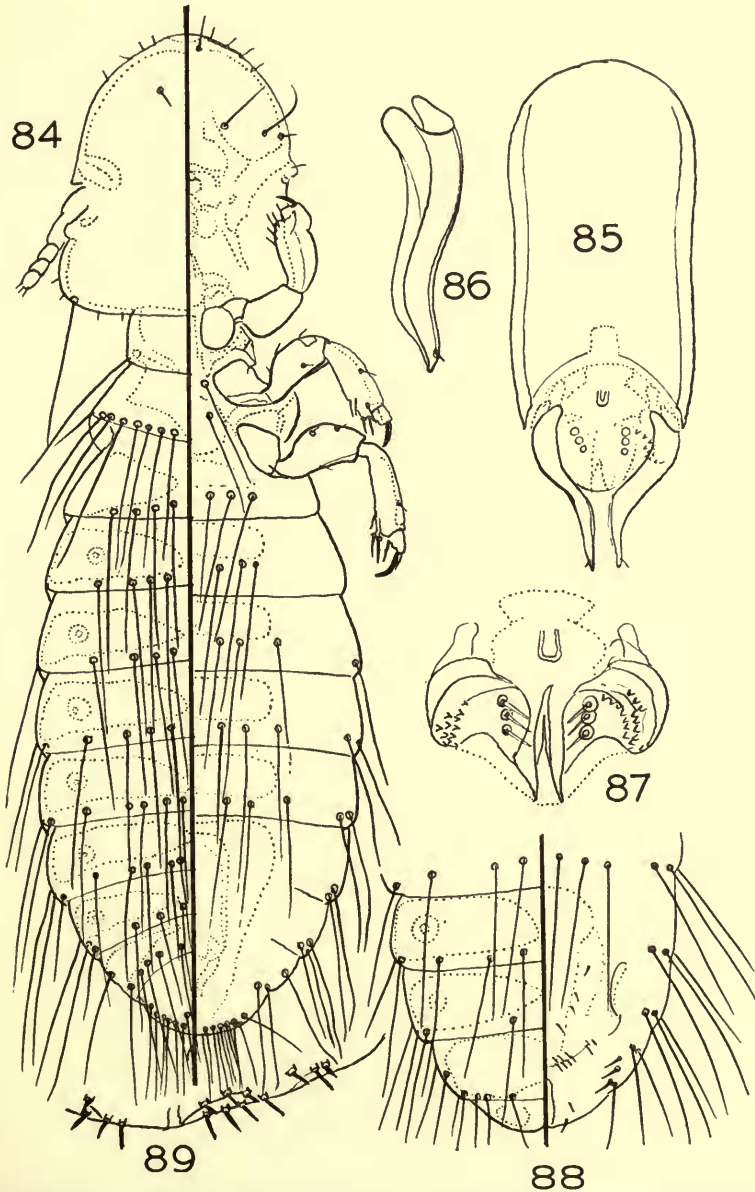
(Text-figs. 84-89)

*Degeeriella koslovae* Clay, 1936, *Proc. zool. Soc. Lond.* 1935 : 908, pl. 1, fig. 3.

Type host : *Podoces biddulphi* Hume.

This species is similar to *Brüelia biguttatus* (Kellogg & Paine) from which it can be easily distinguished by the longer forehead and male genitalia. The abdominal chaetotaxy is more or less the same. In the female the vulva is fringed with 8-9 hairs as against 15-16 in *B. biguttata*.

MALE. Marginal carina moderately sclerotized and runs inwards along the rounded margin in the middle. Ventral carina sclerotized only proximally. Tergal plates II-IX well developed, interrupted in the middle; sternal plates II-VI distinct, confined to the middle. Genitalia as shown in the Text-figs. 85-87.



FIGS. 84-89.—*Brüella koslovae*. (84) Male; (85) male genitalia; (86) paramere; (87) mesosomal plate; (88) terminal segments of female; (89) vulvar chaetotaxy.

FEMALE. Similar to the male, but differs in measurements and chaetotaxy. The marginal hairs on vulva tend to be less than in allied species.

*Abdominal Chaetotaxy*

	Male (type).			Female.		
	Tergal.	Sternal.	Pleural.	Tergal.	Sternal.	Pleural.
Pterothorax .	9+9	1+1	—	8+8	1+1	—
Abdomen II .	1+3+3+1	3+3	0+0	1+2+2+1	3+3	0+0
III .	1+3+3+1	3+3	1+1	1+3+3+1	3+3	1+1
IV .	1+2+2+1	3+3	1+1	1+3+3+1	3+3	3+2
V .	1+3+3+1	3+3	2+2	1+2+2+1	3+3	2+2
VI .	1+4+3+1	3+3	3+3	1+2+3+1	3+3	3+3
VII .	1+4+4+1	0+0	2+2	1+2+2+1	0+0	3+3
VIII .	3+3	0+0	3+3	2+2	0+0	3+3
IX .	4+4	0+0	2+2	3+3	0+0	4+4
X-XI .	9+10	See Text-fig.		—	—	—

Vulva 8+9 hairs.

*Measurements (mm.)*

	Male (type).	Female.
Head : pre-antennal .	0·253 × 0·391	0·261 × 0·397
hind head .	0·239 × 0·479	0·261 × 0·486
Prothorax . . . . .	0·103 × 0·246	0·103 × 0·246
Abdomen . . . . .	0·151 × 0·377	0·171 × 0·383
L : B pre-antennal .	1·131 × 0·554	1·253 × 0·596
L : B hind head . . . . .	1 : 1·54	1 : 1·52
Cephalic index . . . . .	1 : 2·01	1 : 1·97
	1 : 0·97	1 : 0·93

MATERIAL EXAMINED : One male (type) on slide no. 2994, 9 males and 13 females (paratypes) from *Podoces biddulphi* Hume from Kashgaria and East Turkistan, and 4 males and 6 females from *Podoces hendersoni* from Mongolia in Meinertzhagen collection (British Museum (Nat. Hist.)).

*Brüelia biocellata* (Piaget), 1880

(Text-figs. 90-93)

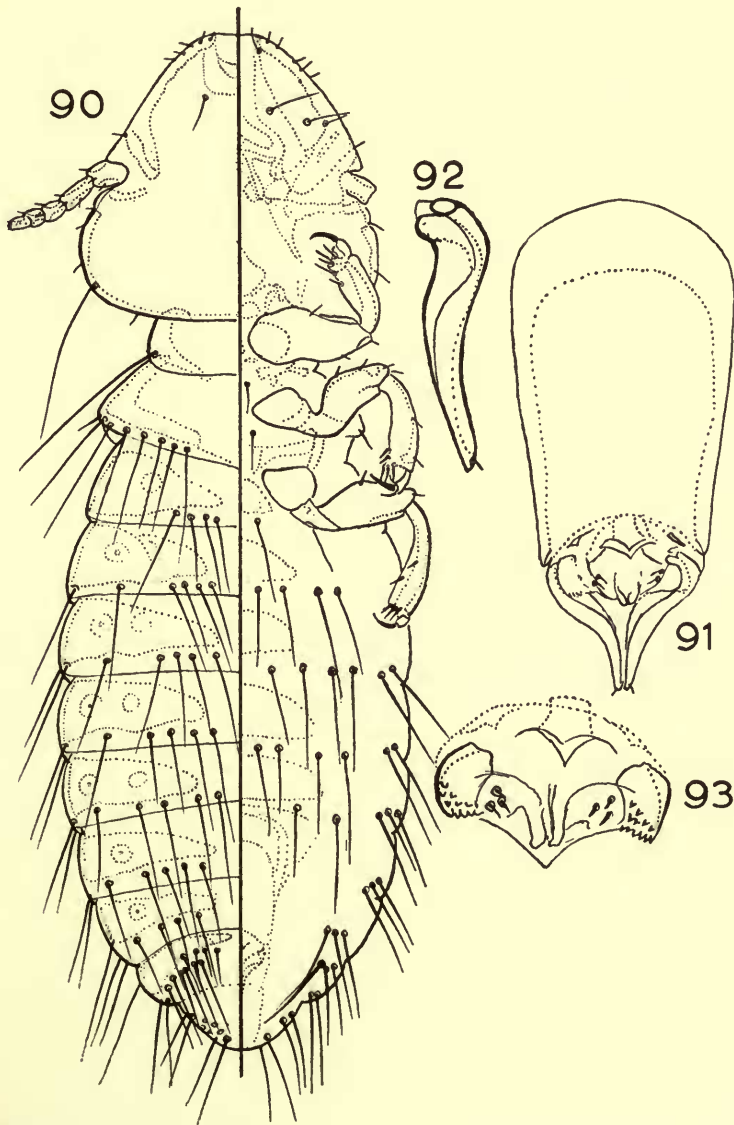
*Nirmus biocellata* Piaget, 1880, *Pédiculines*, 666, pl. 55, fig. 2.

Type host : *Pica pica leucoptera* Gould.

MALE. Marginal carina highly sclerotized, interrupted in the anterior part; anterior margin hyaline and concave in front; ventral carina forming a distinct

band anteriorly. Basal antennal segment robust and twice as long as the conus. Genitalia as shown in Text-figs. 91-93.

FEMALE. No female from the type host was available. Females from *Pica pica hudsonia* are similar to the male with considerable variation in abdominal chaetotaxy.



FIGS. 90-93.—*Brüella biocellata*. (90) Male; (91) male genitalia; (92) paramere; (93) mesosomal plate.

## Abdominal Chaetotaxy

	Male.			Female.		
	Tergal.	Sternal.	Pleural.	Tergal.	Sternal.	Pleural.
Pterothorax .	9+8	1+1	—	8+8	1+1	—
Abdomen :						
II .	3+3	2+2	0+0	3+4	3+3	0+0
III .	1+4+4+1	2+2+2+2	1+1	1+4+3+1	2-3+2-3	1+1
IV .	1+4+4+1	2+2+2+2	2+2	1+4+4+1	2+2	2+2
V .	1+4+4+1	2+2+2+2	2+2	1+4+3+1	1+2+1+2	2+2
VI .	1+3-5+4-5+1	2+2	3+3	1+4+4+1	1+1	2+2
VII .	1+3-5+5+1	0+0	3+3	1+3+3+1	0+0	2+2
VIII .	1+4-5+4-5+1	0+0	3-4+3-4	2+2	0+0	3+3
IX .	10+10	0+0	—	2+2	0+0	4+4
X-XI .		See Text-fig.		—	—	—

Vulva : 17+18 short hairs.

## Measurements (mm.)

	Male (type).	Female.
Head : pre-antennal .	0.233 × 0.445	0.267 × 0.479
hind head .	0.274 × 0.500	0.294 × 0.576
Prothorax . . . . .	0.131 × 0.308	0.109 × 0.315
Pterothorax . . . . .	0.157 × 0.466	0.219 × 0.514
Abdomen . . . . .	1.212 × 0.657	1.452 × 0.733
L : B pre-antennal .	1 : 1.91	1 : 1.79
L : B hind head .	1 : 1.82	1 : 1.95
Cephalic index . . . . .	1 : 0.98	1 : 1.03

MATERIAL EXAMINED. Piaget's collection: one male (type) from *Pica pica leucoptera* Gould. No reliable characters could be discovered to separate 8 males, 2 females from *Pica pica hudsoni*, 4 males, 4 females from *Pica pica nuttalli* from California, 34 males, 30 females from *Pica pica bactriana* from Kabul and Ladakh, one female from *Pica pica sericea* from China.

Two males of *Brüelia nigropicta* (Carriker) (marked paratypes) from *Pica pica hudsonia* (Sabine) from Nebraska in the Hopkins collection were also compared with the *B. biocellata* type and were found to agree in all respects (see also Hopkins and Clay, 1952 : 59).

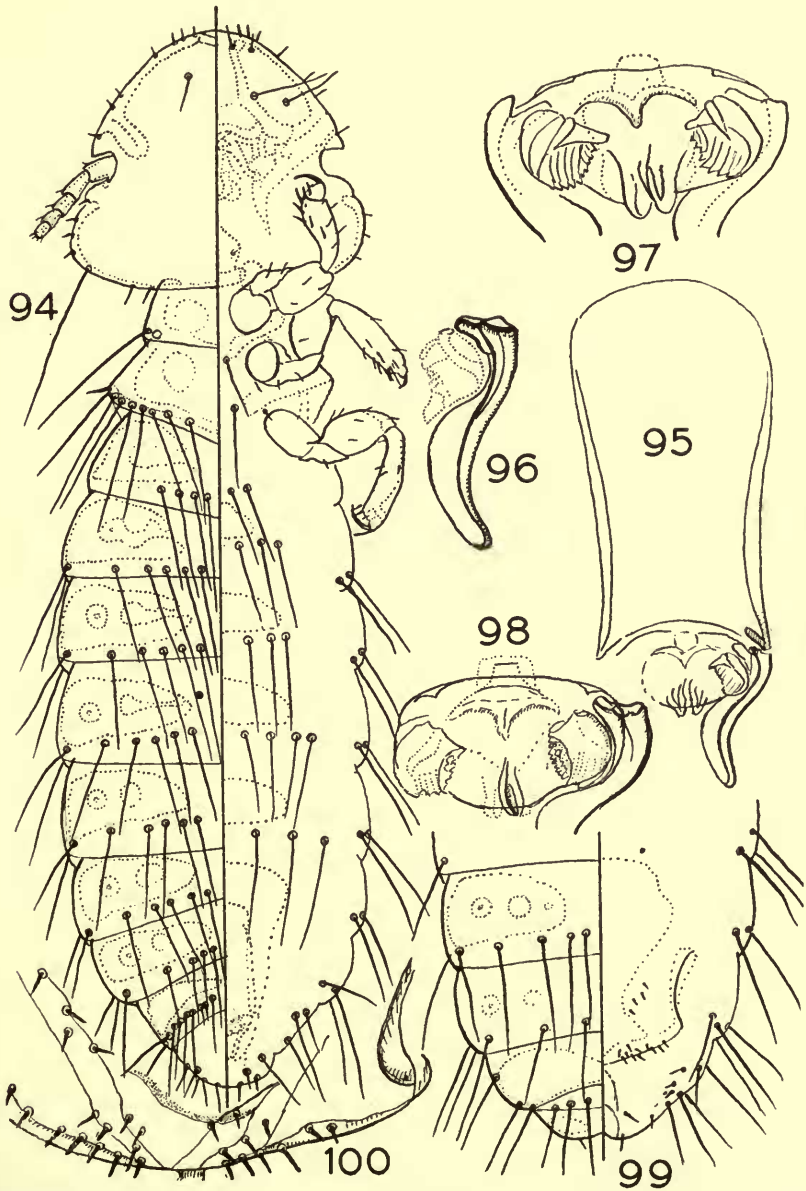
*Brüelia multipunctata* (Clay), 1936

(Text-figs. 94-100)

*Degeeriella multipunctata* Clay, 1936, *Proc. zool. Soc. Lond.* 1935 : 906, pl. 1, fig. 2.Type host: *Nucifraga caryocatactes multipunctata* Gould.

This species is similar to *Brüelia olivacea* (Burmeister), the female of which (the male was not available for comparison) has comparatively fewer hairs on the abdomen and a narrower genital plate.

MALE. Marginal carina complete, but less heavily sclerotized in the middle and with hyaline margin. Tergal plates interrupted in the middle, well developed on segment II-IX. Sternal plates II-V well formed and confined to the middle. Genital



FIGS. 94-100.—*Brüelia multipunctata*. (94) Male; (95) male genitalia; (96) paramere; (97-98) two different aspects of mesosomal plate; (99) terminal segments of female; (100) vulvar chaetotaxy.

plate on segment VI-IX. Abdominal chaetotaxy very constant. Male genitalia as shown in the Text-figs. 95-97.

FEMALE. Similar to the male with slight differences in abdominal chaetotaxy and general body measurements.

	Abdominal Chaetotaxy					
	Male (type).			Female.		
	Tergal.	Sternal.	Pleural.	Tergal.	Sternal.	Pleural.
Pterothorax .	8+8	1+1	—	7+8	1+1	—
Abdomen II .	4+4	2+2	0+0	3+4	3+3	0+0
III .	1+4+4+1	3+3	1+1	1+3+3+1	4+4	2+2
IV .	1+4+4+1	3+3	2+2	1+4+4+1	4+4	3+3
V .	1+4+4+1	4+4	2+2	1+3+3+1	3+3	3+3
VI .	1+4+4+1	3+3	2+2	1+3+3+1	3+3	3+3
VII .	1+4+4+1	0+0	3+3	1+2+2+1	0+0	3+3
VIII .	1+4+4+1	0+0	2+2	2+2	0+0	3+3
IX .	7+6	0+0	2+2	3+3	0+0	4+4
X-XI .	See Text-fig.			—		

Vulva : 9+11 hairs.

#### Measurements (mm.)

	Male (type).	Female.
Head : pre-antennal .	0.212 × 0.438	0.239 × 0.465
hind head .	0.264 × 0.541	0.253 × 0.561
Prothorax . . .	0.123 × 0.260	0.116 × 0.281
Pterothorax . . .	0.164 × 0.417	0.184 × 0.459
Abdomen . . .	1.137 × 0.582	1.438 × 0.616
L : B pre-antennal .	1 : 2.06	1 : 1.90
L : B hind head . .	1 : 2.09	1 : 2.11
Cephalic index . .	1 : 1.18	1 : 1.14

MATERIAL EXAMINED. One male type (slide no. 778), 2 males and 6 females (paratypes) from *Nucifraga caryocatactes multipunctata* Gould from Kashmir in Meinertzhagen collection (British Museum (Nat. Hist.)).

### *Brüelia olivacea* (Burmeister), 1938

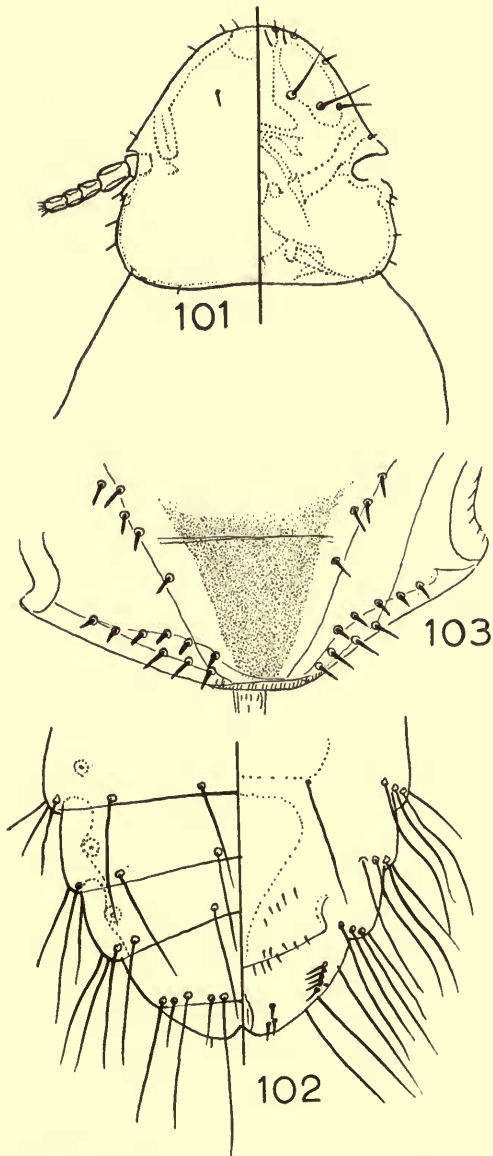
(Text-figs. 101-103)

*Nirmus olivacea* Burmeister, 1838, *Handb. Ent.* 2 : 431.

Type host : *Nucifraga c. caryocatactes* (Linn.).

Unfortunately no male specimens were available. One female from the type-host was very similar to *Brüelia multipunctata* (Clay), but could be easily distinguished by the abdominal chaetotaxy and genital plate.





FIGS. 101-103.—*Brüelia olivacea*. (101) Head of female; (102) terminal segments of female; (103) vulvar chaetotaxy.

*Abdominal Chaetotaxy*

		Female.		
		Tergal.	Sternal.	Pleural.
Pterothorax	. . .	8+8	I+I	—
Abdomen	II . . .	I+I	I+I	0+0
	III . . .	I+I	I+I	0+0
	IV . . .	I+I+I+I	I+I	3+3
	V . . .	I+I+I+I	I+I	3+3
	VI . . .	I+I+I+I	I+I	3+3
	VII . . .	I+I+I+I	0+0	4+4
	VIII . . .	I+I+I+I	0+0	4+4
	IX . . .	See Text-fig.	—	—
Vulva	. . . .	9+9 marginal hairs.	—	—

*Measurements (mm.): Length × breadth.*

		Female.
Pre-antennal region	. . .	0.233 × 0.438
Hind head	. . .	0.267 × 0.507
Prothorax	. . .	0.130 × 0.294
Pterothorax	. . .	0.308 × 0.472
Abdomen	. . .	1.131 × 0.692
L : B pre-antennal	. . .	I : 1.88
L : B hind head	. . .	I : 1.89
Cephalic index	. . .	I : 1.01

MATERIAL EXAMINED. One female from type host (*Nucifraga c. caryocatactes* (Linn.)) from Germany in the British Museum (Nat. Hist.) collection.

*Brüelia hamatofasciata* (Piaget), 1890

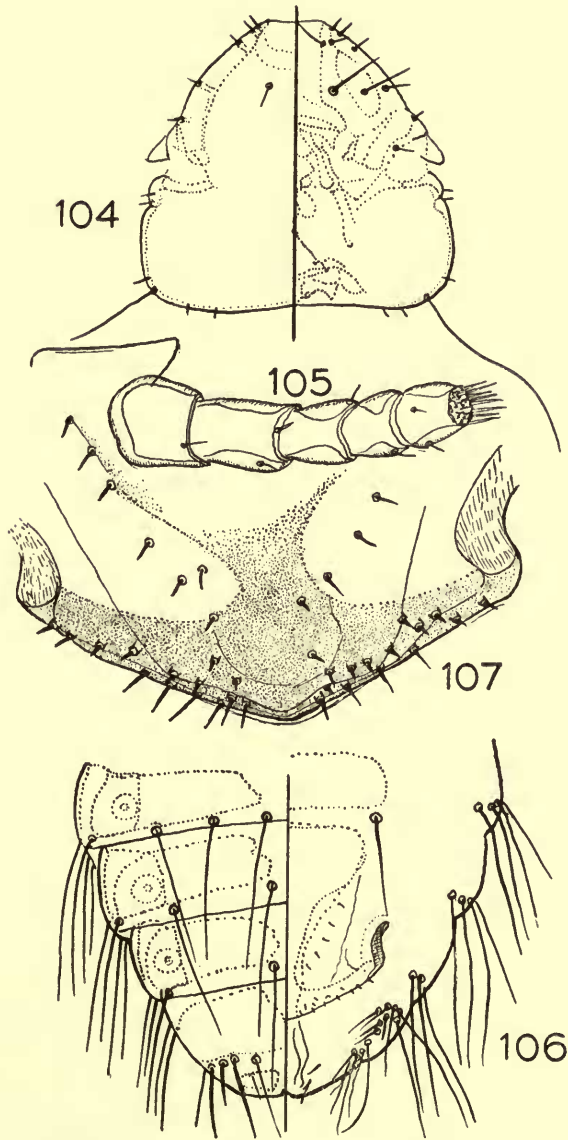
(Text-figs. 104–107)

*Docophorus hamatofasciata* Piaget, 1890, *Tijdschr. Ent.* 33 : 225, pl. 8, fig. 3.

Type host : (*Penelopides manilae* error) Probably some member of the Corvidae.

Piaget (1890) described this species from a female from *Penelopides manilae*. The type specimen now in the British Museum Collection, shows that it is a *Brüelia* species of the type infesting the Corvidae.

In the female (type) the marginal carina is interrupted medially, with the anterior plate well developed. Ventral carina is sclerotized proximally. Tergal plates II–VIII interrupted in the middle and plate IX is entire. Chaetotaxy as given in the table below.



FIGS. 104-107.—*Brüelia hamatofasciata*. (104) Female; (105) female antenna; (106) terminal segments of female; (107) vulvar chaetotaxy.

## Abdominal Chaetotaxy

		Female (type).		
		Tergal.	Sternal.	Pleural.
Pterothorax	.	8+10	1+1	—
Abdomen	II	1+1	1+1	1+1
	III	1+1	1+1	1+1
	IV	1+1+1+1	1+1	2+2
	V	1+1+1+1	1+1	3+3
	VI	1+1+1+1	1+1	4+4
	VII	1+1+1+1	0+0	4+4
	VIII	1+1	0+0	4+4
	IX	3+3	0+0	See Text-fig.
	Vulva	.	14+15 Marginal hairs	—

## Measurements (mm.)

		Female.
Pre-antennal region	.	0.246 × 0.445
Hind head	.	0.281 × 0.561
Prothorax	.	0.116 × 0.349
Pterothorax	.	0.253 × 0.582
Abdomen	.	1.212 × 0.794
L: B pre-antennal	.	1 : 1.81
L: B hind head	.	1 : 1.99
Cephalic index	.	1 : 1.06

This form is similar to that from *Pica p. nuttali*, from which it can be easily distinguished by the abdominal chaetotaxy, pigmentation of ventral carina and genital plate.

It will probably be useful to know that Piaget collected Mallophaga from the following Corvidae: *Pica p. pica* and *Pica p. leucoptera* (Gould) when he described the species under consideration.

MATERIAL EXAMINED. Piaget's collection one female (type) in British Museum (Nat. Hist.).

## SUMMARY

All the known species of *Brüelia* from Corvidae other than *Corvus* species are discussed, two sub-species and six new species are described. The species of previous authors are redescribed and figured.

## LIST OF SPECIES DISCUSSED

(Type host in bold type and synonyms in brackets)

1. *Brüelia biguttata* (Kellog & Paine), 1914.

***Pyrrhocorax g. graculus.***

*Pyrrhocorax p. pyrrhocorax.*

*Pyrrhocorax p. pontifex.*

*Pyrrhocorax p. himalayanus.*

2. *Brüelia biguttata docilis* new subspecies.  
***Pyrrhocorax p. docilis.***
3. *Brüelia biocellata* (Piaget), 1880.  
***Pica p. leucoptera.***  
*Pica p. hudsonia.*  
*Pica p. nuttalli.*  
*Pica p. bactriana.*  
*Pica p. sericea.*  
  
(*Brüelia nigropicta* (Carriker), 1902.)  
***Pica p. hudsonia.***
4. *Brüelia clayae* new species.  
***Cyanocitta cristata cristata.***
5. *Brüelia deficiens* (Piaget), 1885.  
***Cyanopica cyanus cooki.***  
*Aphelocoma c. californica.*  
*Cyanocitta stelleri frontalis.*  
  
(*Brüelia ampullata* (Piaget), 1885.)  
***Cyanopica cyanus cooki.***
6. *Brüelia glandarii* (Denny), 1842.  
***Garrulus g. rufitergum.***  
*Garrulus g. glandarius.*  
*Garrulus g. theresae.*  
*Garrulus g. krynicki.*
7. *Brüelia glandarii perisoreus* new subspecies.  
***Perisoreus i. infaustus.***
8. *Brüelia hamatofasciata* (Piaget), 1890.  
(*Penelopides manilae* (error)).
9. *Brüelia hopkinsi* new species.  
***Xanthoura yncas galeata.***
10. *Brüelia husaini* new species.  
***Urocissa flavirostris cuculata.***  
*Urocissa melanocephala occipitalis.*
11. *Brüelia koslovae* (Clay), 1936.  
***Podoces biddulphi.***  
*Podoces hendersoni.*
12. *Brüelia meinertzhageni* new species.  
***Dendrocitta rufa vagabonda.***

13. *Brüelia multipunctata* (Clay), 1936.

*Nucifraga caryocatactes multipunctata.*

14. *Brüelia nitzschi* Kéler, 1938.

*Cyanocorax cyanomelas.*

15. *Brüelia olivacea* (Burmeister), 1838.

*Nucifraga c. caryocatactes.*

16. *Brüelia zavattariornis* new species.

*Zavattariornis stresemanni.*

17. *Brüelia zohrae* new species.

*Philostomus afer.*

